

SIEMENS

PATENT
Attorney Docket No. 2002P17478WOUS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Inventor:	M. Herbst)	Group Art Unit:	3745
)		
Serial No.:	10/532,173)	Examiner:	White, Dwayne J.
)		
Filed:	03/27/2006)	Confirmation No.	6185
Title:	WIND POWER UNIT WITH STRUCTURED SURFACES FOR IMPROVEMENT OF FLOW			

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APPELLANTS' BRIEF UNDER 37 CFR 41.37

Sir:

This brief is in furtherance of the Notice of Appeal filed in this application on 15 July
2009.

(Please proceed to the following page.)

1. REAL PARTY IN INTEREST - 37 CFR 41.37(c)(1)(i)

The real party in interest in this Appeal is the assignee of the present application, Siemens Aktiengesellschaft.

2. RELATED APPEALS AND INTERFERENCES - 37 CFR 41.37(c)(1)(ii)

There is no other appeal, interference or judicial proceeding that is related to or that will directly affect, or that will be directly affected by, or that will have a bearing on the Board's decision in this Appeal.

3. STATUS OF CLAIMS - 37 CFR 41.37(c)(1)(iii)

Claims canceled: 1 – 10, 13 and 14.

Claims withdrawn but not canceled: None.

Claims pending: 11, 12, and 15 - 30.

Claims allowed: none.

Claims rejected: 11, 12, and 15 - 30.

The claims on appeal are 11, 12, and 15 - 30. A copy of the claims on appeal is attached hereto in the Claims Appendix. Appellants respectfully appeal the final rejection of claims 11, 12, and 15 - 30.

4. STATUS OF AMENDMENTS - 37 CFR 41.37(c)(1)(iv)

In response to the Final Office Action mailed 15 April 2009, on 10 June 2009 Appellants filed a Response with proposed amendment to address a typographical error. No substantive amendment was made to the claims. The Response also presented argument traversing the final rejection. The Advisory Action mailed 2 July 2009 indicates that the amendment was entered but that argument traversing the rejection was not found persuasive. The Advisory Action provided further explanation of the Examiner's reasoning for rejecting the claims. Argument in this Appeal Brief addresses the remarks made in the Advisory Action.

5. SUMMARY OF THE CLAIMED SUBJECT MATTER- 37 CFR 41.37(c)(1)(v)

With reference by page and line number to the detailed description, and with reference to the figures, the following summary describes one or more exemplary embodiments disclosed in the Specification and which are covered by one or more specific claims, but it is to be understood that the claims are not so limited in scope.

5A. CONCISE EXPLANATION OF SUBJECT MATTER DEFINED IN INDEPENDENT CLAIM 11.

With reference to the several embodiments shown in the figures, **Independent claim 11** is directed to a wind power unit 17 and a flow field (See page 1, lines 12 – 13, Figures 1, 9 and 12), having a mast 12, a nacelle 19, 20 associated with the mast, and a rotor (Figure 12). See page 7, line 33 – page 8, line 2; and line 1 of the Abstract.

The mast 12 is positionable to receive a laminar flow of air 16 along a path 16/15 having a direction generally transverse to a direction along which the mast has a variable width, the mast including a maximum width measurable in a direction transverse to the laminar flow. See page 7, lines 21 – 31 and Figure 11. The rotor, as shown in Figure 12 includes a plurality of rotor blades 18, and at least one rotor blade 18 has a plurality of recesses 1 each having a shape in accord with the shape of a hemisphere. See page 5, lines 5 – 24; and page 8, lines 7 – 9.

As shown in Figure 9, and described at page 7, lines 1 – 8, each recess 1 is positioned the same distance from all adjacent recesses to improve flow arranged on the rotor blades 18, approximately in the region between the transition point between laminar and turbulent flow (such as described for the mast 12 at page 7, lines 21 – 31). The final edge of the rotor blade and the shape and configuration of the recesses 1 are designed such that, as the air sweeps past a recess 1, alternating flow eddies form in the recess 1 that assist with continued laminar flow of the air while also reducing flow resistance along the surface 2 (see page 5, lines 5 – 6) relative to flow in the absence of the recesses. See, for example, the sequence of illustrations shown in Figures 2 – 7 and described at page 7, line 18 – page 8, line 20 as well as Figure 8 which is described at page 7, lines 22 – 33.

The mast 12 is characterized by a transition point 14 along the flow path 16/15 wherein a flow portion: (i) has predominantly laminar characteristics when travelling toward the transition point, i.e., in the portion 16 of the path 16/15; and (ii) is characterized by turbulent flow 15 when travelling away from the transition point, i.e., along the portion 15 of the path 16/15. The transition point 14 is positioned relative to a second point 10 (see prior art Figure 10) on the mast 12 coinciding with the maximum width such that the flow portion first passes along the second point 10 before passing the transition point 14. See, again, page 7, lines 21 – 31.

5B. CONCISE EXPLANATION OF SUBJECT MATTER DEFINED IN INDEPENDENT CLAIM 22.

With reference to the several embodiments shown in the figures, **Independent claim 22** is directed to a wind power unit 17 (See page 1, lines 12 – 13, Figures 1, 9 and 12), having a mast 12, a nacelle 19, 20 associated with the mast 12, a rotor (Figure 12) and a plurality of rotor blades 18. See page 7, line 33 – page 8, line 2; and line 1 of the Abstract; and Figure 12.

The mast and rotor each include along a surface 2 (see page 5, lines 5 – 6) thereof a plurality of recesses 1 each having a shape corresponding to that of a contour of a hemisphere (see page 5, lines 5 – 24; and page 8, lines 7 – 9). As shown in Figure 9, and described at page 7, lines 1 – 8, each recess 1 is positioned the same distance from all adjacent recesses. This is believed to improve laminar flow along the rotor blades 18.

The shape and configuration of the recesses 1 are designed such that, as the air sweeps past a recess 1, one or more eddy flows form in the recess that assist with passage of the air at reduced resistance relative to conditions in the absence of the recesses. See, for example, the sequence of illustrations shown in Figures 2 – 7 and described at page 7, line 18 – page 8, line 20 as well as Figure 8 which is described at page 7, lines 22 – 33.

Also in accord with claim 22, a pattern of the alternating flow eddies 3, 4 develop over the surface, extending from one recess to a next recess in the array as a function of air flow speed. See, again, page 7, line 18 – page 8, line 20, as well as Figure 8 which is described at page 7, lines 22 – 33.

5C. CONCISE EXPLANATION OF SUBJECT MATTER DEFINED IN INDEPENDENT CLAIM 25.

With reference again to the several embodiments shown in the figures, **Independent claim 25** is directed to a wind power unit 17 (See page 1, lines 12 – 13, Figures 1, 9 and 12), having a mast 12, a rotor (Figure 12) and a plurality of rotor blades 18. See page 7, line 33 – page 8, line 2; and line 1 of the Abstract; and Figure 12.

With the mast or one of the plurality of rotor blades including along a surface 2 (see page 5, lines 5 – 6) thereof a plurality of recesses 1, each having a shape in accord with at least a sector of a hemisphere, the rotor blades 18 are configured to sweep past the mast 12 when exposed to a force or pressure of air flowing in a direction extending toward and past the blades and mast. See page 1, line 20 – page 2, line 4 (prior art); page 2, lines 18 – 31; page 3, lines 15 – 17; page 5, lines 11 – 24; Figure 2.

As shown in Figure 9, and described at page 7, lines 1 – 8, each recess 1 is positioned the same distance from all adjacent recesses with the recesses 1 configured as an array, e.g., horizontal rows with adjacent rows laterally offset to position recesses the same distance from one another. The shape and configuration of the recesses 1 are designed such that, as the air sweeps past a recess 1, flow eddies 3, 4 form in the recesses that assist with the passage of air flow 16 at reduced resistance relative to flow in the absence of such recesses. See, for example, the sequence of illustrations shown in Figures 2 – 7 and described at page 7, line 18 – page 8, line 20 as well as Figure 8 which is described at page 7, lines 22 – 33.

The array of recesses 1 is operatively positioned in a region on the surface 2 along which the air flow passes to cause, in the presence of flowing air, a point 14 along the direction of the air flow at which transition between laminar flow 16 and turbulent flow 15 occurs under the force of air flow, to be displaced (e.g., relative to a second point 10 shown in prior art Figure 10) in the direction of the air flow, so that resistance to the air flow is reduced. See, again, page 7, line 18 – page 8, line 20 as well as Figure 8 which is described at page 7, lines 22 – 33.

6. GROUNDS OF REJECTION TO BE REVIEWED UPON APPEAL - 37 CFR 41.37(c)(1)(vi)

1. Whether claims 11, 12, 15 – 17 and 19 – 30 are unpatentable under 35 U.S.C. Section 103 over Hickey (U.S. 4,974,633) in view of Olsen (WO 02/064422A1).
2. Whether claims 11, 17 and 18 are unpatentable under 35 U.S.C. Section 103 over Hickey (U.S. 4,974,633) in view of Wobben (U.S. 6,729,846).

Appellant submits that the art rejections cannot identify every feature of independent claims 11, 22 and 25 and the claims which depend therefrom; and, even if it were possible to simply reassemble the prior art, there is no motivation in the cited art for the combinations recited in the claims.

7. ARGUMENT 37 CFR 41.37(c)(1)(vii)

7A. APPELLANT TRAVERSES ALL REJECTIONS BASED IN WHOLE OR PART ON Hickey (U.S. 4,974,633) IN COMBINATION.

Patentability of Each Claim is to be Separately Considered

Appellant urges that, to the extent the claims are separately argued, patentability of each claim should be separately considered. General argument, based on deficiencies in the rejection of independent claims 11, 22 and 25 demonstrates patentability of all dependent claims. However, none of the rejected claims stand or fall together because each dependent claim further defines a unique combination that patentably distinguishes over the art of record. For this reason, the Board is requested to consider all argument presented with regard to each dependent claim. Argument demonstrating patentability of each dependent claim is presented under subheadings identifying each claim by number.

General Basis To Overturn All Rejections Under Section 103

In order to sustain the rejection of independent claims 19 and 28 MPEP §2143 provides that, to establish a prima facie case of obviousness, three criteria must be met.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one skilled in the art, to modify the reference or to combine teachings of the references. Second, there must be a reasonable expectation of success. Third, the prior art must teach or suggest **all** of the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be both found in the prior art and not in the applicant's disclosure.

It is fundamental that all of the claimed features be found in the prior art combination in order to make a rejection. Yet this appeal is made because the prior art combinations used to reject the claims fail to provide all of the features and functions recited in each claim. By way of example, the following argument addresses the lack of demonstrable motivation in the prior art to apply features of the claims to the mast of a wind power unit. The argument also addresses failure in the prior art combinations to provide the shapes of the claimed recesses. There is no motivation in the art to modify the shapes disclosed in the references. Nor is there any basis to read the claim language (e.g., a shape in accord with the shape of a hemisphere) on a shape that does not conform to that of a hemisphere.

7B. THE REJECTION OF INDEPENDENT CLAIM 11 UNDER SECTION 103 BASED ON HICKEY (U.S. 4,974,633) IN VIEW OF OLSEN (WO 02/064422A1) IS IN ERROR.

Any art rejection, whether raised under Section 102 or under Section 103, must still identify all of the claimed features. It must also be established that there is a motivation to combine the references. The following discussion illustrates how the rejection fails to identify all of the claimed features. Nor is there any motivation to combine the references and, absent identification of all claimed features, this only results in a hindsight reconstruction which lacks numerous ones of the claimed features.

Claim 11 is directed to a wind power unit and a flow field. In the amendment filed 18 December 2008 claim 11 was amended to fully distinguish over the combination of Hickey in view of Olsen. First, it is noted that the claim recites

“at least one rotor blade having a plurality of recesses each having a shape in accord with the shape of a hemisphere ...”

That is, the shapes of the recesses may be hemispheres or may have contours consistent with the curvature of hemispheres. The prior art does not disclose any recesses of shape in accord with a hemisphere. By way of example, the Hickey reference expressly discloses details of a concave indentation (figure 4) that includes a protruding central deviation 46 and protruding deviation sets 48a - 48e. See col. 2, lines 46-54. These features are inconsistent with applicant's teaching of recesses having the curvature of hemispheres. The final rejection (see page 3 of the final office action) nonetheless contends that example pattern 67 shown in Figure 5 of Hickey illustrates hemispherical recesses in a pattern with each positioned “the same distance from each adjacent recess ...” Claim 11 requires that

each recess [is] positioned the same distance from **all** adjacent recesses ...

and, as can be seen from the star-shaped design of pattern 67, numerous recesses on different rays of the star which are adjacent one another are spaced apart varying distances from one another. This claim recitation reads on Appellant's own Figure 9 (in accord with text at paragraph [0038]), but this feature simply cannot be read on the pattern 67 of Hickey.

Claim 11 also requires that, as the air sweeps past a recess:

“alternating flow eddies form in the recess that assist with continued laminar flow of the air while also reducing flow resistance along the surface relative to flow in the absence of the recesses ...”

Only the Appellant teaches flow eddies *formed in the recess* as air sweeps past the recess. The argument used in the rejection to contradict this distinction is built on a false premise. By blurring the distinction between the word “hemispherical” and the above claim language (requiring that each recess have “a shape **in accord with the shape** of a hemisphere”) the

rejection argues that the claimed features are inherently present in the prior art. That is, being hemispherical-like is **not the same** as being in accord with the shape of a hemisphere. With this improper foundation that there is a disclosure in the prior art of Appellant's

“recesses each having a shape corresponding to that of a contour of a hemisphere”

the rejection incorrectly asserts that all of the features resulting from the claimed shape/contour are inherently present in the prior art. With argument grounded in such an incorrect premise, the rejection must fail. More specifically, there is no basis to contend that any of the shapes of recesses shown in the Hickey reference (*e.g., Figure 4 shows a concave indentation with a protruding central (convex) deviation 46 and protruding (convex) deviation sets 48a - 48e as described at col. 2, lines 46-54*) could enable

“alternating flow eddies [to] form in the recess ...[to] ... assist with continued laminar flow of the air while also reducing flow resistance along the surface relative to flow in the absence of the recesses ...”

To this point, that there is no teaching or disclosure supporting the contention that the prior art provides the claimed function, it must be noted that the Examiner has cited the Olsen reference which discloses surface formations (including a cavity) as shown in Figures 4 and 5 and 6 while the disclosure of Olsen makes clear at page 1, lines 18 – 20 that not all shapes provide the claimed function of assisting “with continued laminar flow ...” but rather, some shapes can be used to change laminar flow into turbulent currents. This is inconsistent with the Appellant's teachings and claim 11.

Furthermore, another reason claim 11 is distinct and non-obvious is illustrated for the embodiment shown in Figure 11 of the application. Both the prior art mast of Figure 10 and the mast 12 of Figure 11 are characterized by a transition point along the flow path wherein a flow portion: (i) has predominantly laminar characteristics when travelling toward the transition point; and (ii) is characterized by turbulent flow when travelling away from the transition point, **but**, for the mast of claim 11 (including the embodiment of Figure 11):

the transition point is positioned relative to a second point on the mast coinciding with the maximum width [of the mast] such that the flow portion first passes along the second point before passing the transition point.

Only the Appellant teaches to improve flow in a direction along the flow path about the mast of a wind power unit by displacing the recited transition point (e.g., relative to the prior art transition point 10 of Figure 10). As explained in the specification, with an arrangement of recesses (*i.e.*, "*positioned the same distance from **all** adjacent recesses*") such as shown in the example of Figure 9, the flow is modified such that:

in travelling toward the transition point the flow has predominantly laminar characteristics and
in travelling away from the transition point the flow is characterized by turbulent flow.

With these distinctions claim 11 defines non-obvious subject matter.

7C. THE REJECTION OF INDEPENDENT CLAIM 22 UNDER SECTION 103 ALSO BASED ON HICKEY (U.S. 4,974,633) IN VIEW OF OLSEN (WO 02/064422A1) IS ALSO IN ERROR.

Claim 22 is also directed to a wind power unit. In the amendment filed 18 December 2008 claim 22 was also amended to fully distinguish over the combination of Hickey in view of Olsen. First, it is noted that the claim recites that:

the mast and rotor each include along a surface thereof a plurality of recesses each having a shape corresponding to that of a contour of a hemisphere, each recess positioned the same distance from all adjacent recesses ...

As urged with respect to claim 11, the shapes of the recesses may be hemispheres or may have contours consistent with the curvature of hemispheres while the prior art does not disclose any recesses of shape in accord with the contour of a hemisphere. As already noted, the Hickey reference expressly discloses details of a concave indentation (figure 4) that includes a protruding central deviation 46 and protruding deviation sets 48a - 48e. See col. 2, lines 46-54. These features are inconsistent with applicant's teaching of recesses each having a shape corresponding to that of a contour of a hemisphere.

The final rejection (see page 3 of the final office action) nonetheless also contends that example pattern 67 shown in Figure 5 of Hickey is the same as that which is claimed. That pattern 67 is not consistent with the recited feature wherein

“each recess [is] positioned the same distance from **all** adjacent recesses ...”

As can be seen from the star-shaped design of pattern 67, numerous recesses on different rays of the star are adjacent one another while also being spaced apart varying distances from one another. Appellant requires that “each recess [is] positioned the same distance from **all** adjacent recesses ...” Thus, while the claim recitation does read on the array shown in Appellant’s own Figure 9 (in accord with text at paragraph [0038]), the recitation simply cannot be read on the prior art pattern 67 of Hickey.

Furthermore, another reason claim 22 is distinct and non-obvious is that

“the shape and configuration of the recesses are designed such that as the air sweeps past a recess, one or more eddy flows form in the recess that assist the passage of the air at reduced resistance relative to conditions in the absence of the recesses ...”

Appellant’s claim 22 also specifically requires that

“a pattern of the alternating flow eddies develop over the surface, extending from one recess to a next recess in the array as a function of air flow speed.”

As best understood, the rejection again contends, based on a false premise regarding the claimed shape of the recesses disclosed in the Hickey reference: that there is disclosure in the prior art of Appellant’s “recesses each having a shape corresponding to that of a contour of a hemisphere ...” However, *Hickey does not disclose “a plurality of recesses each having a shape corresponding to that of a countour of a hemisphere, each recess positioned the same distance from all adjacent recesses ...)* and so there is no basis to contend that either of the above-quoted features:

“one or more eddy flows form in the recess that assist the passage of the air at reduced resistance relative to conditions in the absence of the recesses ...”

or

“a pattern of the alternating flow eddies develop over the surface, extending from one recess to a next recess in the array as a function of air flow speed ...”

is inherently present in the arrangement disclosed by the Hickey reference.

It is only with this improper and incorrect foundation that there is a disclosure in the prior art of Appellant's

“recesses each having a shape corresponding to that of a contour of a hemisphere”
that the rejection incorrectly asserts that all of the functional features resulting from the claimed shape/contour of Appellant's recesses are inherently present in the prior art.

With argument only grounded in such an incorrect premise, the rejection must fail. More specifically, there is no basis to contend that any of the shapes of recesses shown in the Hickey reference (*e.g.*, *Figure 4 shows a concave indentation with a protruding central (convex) deviation 46 and protruding (convex) deviation sets 48a - 48e as described at col. 2, lines 46-54*) could enable

one or more eddy flows [to] form in the recess that assist the passage of the air at reduced resistance relative to conditions in the absence of the recesses, and wherein a pattern of the alternating flow eddies develop over the surface, extending from one recess to a next recess in the array as a function of air flow speed.

Example embodiments of these claimed features are shown in the sequence of Figures 2 – 7 and in the illustrations of Figures 8 and 9. None of the prior art discloses any such functionality. The recesses of the prior art do not comport with the claimed “shape corresponding to that of a contour of a hemisphere ...” as required by claim 22. This deficiency precludes any conclusion that the claimed feature is present in the prior art. Argument concerning claim 11 references the Olsen reference to illustrate that one cannot assume that any shape will enhance laminar flow or provide eddy currents in or between the recesses.

Another distinction is that the above-recited features are for recesses along the surfaces of the mast and rotor while the prior art recesses are not disclosed as placed on either a mast or a rotor. Despite the allegations of obviousness, there is no basis (*i.e.*, no teaching or motivation) in any of the applied art to apply the recesses disclosed by Hickey to a mast or a rotor. None of the

prior art discloses, or expresses any interest or concern regarding, the mast or rotor which would lead one skilled in the art to apply Appellant's recesses thereto.

7D. THE REJECTION OF INDEPENDENT CLAIM 25 UNDER SECTION 103 ALSO BASED ON HICKEY (U.S. 4,974,633) IN VIEW OF OLSEN (WO 02/064422A1) IS ALSO IN ERROR.

Claim 25 is also directed to a wind power unit. The claim recites that:

the mast or one of the plurality of rotor blades includes along a surface thereof a plurality of recesses each having a shape in accord with at least a sector of a hemisphere, each recess positioned the same distance from **all** adjacent recesses ...

It has already been illustrated in the above argument for claims 11 and 22 that the Hickey reference does not disclose these features. Compare Figure 4 of Hickey with Figure 9 of the present application. The above recitation cannot be read upon Figure 4 of the Hickey reference because the recesses of that Figure 4 are not all (i.e., each recess) positioned the same distance from **all** adjacent recesses.

Claim 25 further states, based on the foregoing, that the recesses are

"configured as an array of design such that, as the air sweeps past the recesses, flow eddies form in the recesses that assist with the passage of air flow at reduced resistance relative to flow in the absence of such recesses ..."

and because the structure required for this function is absent from the Hickey reference it was error to assert that the Appellant's flow eddies (formed in the recesses to assist with the passage of air flow) might be present in the prior art. This is no more than mere speculation.

Appellant has developed a new design which is accompanied by novel features not taught or suggested in the prior art. The prior art does not disclose any such features (e.g., flow eddies formed in the recesses to assist with the passage of air flow). Otherwise, there might have been a basis to argue that the claimed function might be found in the prior art. The structure of recesses "each having a shape in accord with at least a sector of a hemisphere" remains absent from the prior art.

Claim 25 further requires that

“the array [is] ... operatively positioned in a region on the surface along which the air flow passes to cause, in the presence of flowing air, a point along the direction of the air flow at which transition between laminar and turbulent flow occurs under the force of air flow, to be displaced in the direction of the air flow, so that resistance to the air flow is reduced.”

There is simply no basis to contend that this feature is present in the combination of Hickey in view of Olsen. The rejection (see pages 2 -3 of the final office action) does not address this feature of claim 22. There is no prima facie case of obviousness.

7E. THE REJECTIONS UNDER SECTION 103 OF CLAIMS 12, 15 – 17, 19 – 21, 23, 24, and 26 – 30 WHICH EACH DEPEND FROM CLAIM 11, CLAIM 22 OR CLAIM 25, ALSO BASED ON HICKEY (U.S. 4,974,633) IN VIEW OF OLSEN (WO 02/064422A1) IS ALSO IN ERROR.

7E(1) CLAIM 12 IS ALLOWABLE UNDER SECTION 103.

Claim 12 requires that the recesses recited as being shaped as hemispheres “are also arranged on the mast.” In response, using hindsight knowledge of the invention, the rejection extrapolates from a general statement in the summary of the invention of the Hickey reference which states that at least one surface of an object is in contact with a fluid medium and on that surface there are surface deviations arranged in a predetermined pattern. See col. 1, lines 36 – 42. None of this suggests applying the surface deviations of Hickey to the surface of a mast and, even if this were to occur, as noted above, the surface deviations of Hickey do not conform to Appellant’s “shape in accord with the shape of a hemisphere ...” All of the argument presented in this rejection appears to be taken directly from Appellant’s patent application and misapplied to the prior art. There is no support for any such argument in the prior art. The Olson reference is relied upon for disclosure of “drag reducing recesses” but none of this relates to the claimed features of a mast and none of this relates to Appellants recesses. The possible linkage, noted in the rejection, of the prior art features being related to aerodynamics, is of no avail since the prior art does not recognize advantages of applying Appellant’s features (or, any other aerodynamic features) to the mast of a wind power unit. Absent any recognition of the solution (or the underlying problem) it is not seen how there could be any motivation to reconstruct the prior art.

7E(2) CLAIM 15 IS ALLOWABLE UNDER SECTION 103.

In the wind power unit according to claim 15, the recesses are arranged in rows configured as an array having design such that,

as the air sweeps past the recesses, multiple flow eddies form in multiple ones of the recesses that assist with passage of the air flow with reduced resistance, the array being operatively positioned in a region on the surface along which the air flow passes to cause, in the presence of flowing air, a point along the direction of the air flow at which transition between laminar and turbulent flow occurs under the force of air flow, to be displaced in the direction of the air flow, so that resistance to the air flow is reduced.

There is simply no basis to contend that this feature is present in the combination of Hickey in view of Olsen. The rejection (see pages 2 -3 of the final office action) does not address this feature of claim 15.

7E(3) CLAIM 16 IS ALLOWABLE UNDER SECTION 103.

In the wind power unit according to claim 16, the rows are arranged offset with respect to each other. The rejection argues that Olsen teaches teardrop shaped recesses, but the recesses of Olsen are inconsistent with the recesses claimed by Appellant and would not result in the combination of claim 15 because Olsen is directed to shapes of recesses which do not enhance laminar flow. See page 1, lines 17 – 20 which indicate that all embodiments of Olsen relate to creating turbulent currents which break up laminar flow. As noted in claim 15 from which claim 16 depends, Appellant requires extending the length of laminar flow, i.e., with

“a point along the direction of the air flow at which transition between laminar and turbulent flow occurs under the force of air flow ... [is] displaced in the direction of the air flow, so that resistance to the air flow is reduced.”

7E(4) CLAIM 17 IS ALLOWABLE UNDER SECTION 103.

In the wind power unit according to claim 17, the recesses are configured on a flat support material, which can be fixed on or to the wind power unit. The rejection attempts to find this subject matter in Figure 6 of Olsen, but as explained at page 6, line 23 – page 7, line 6, the surface of plate 64 is not formed with a recess. Rather, the disclosure indicates that a wall is formed by punching the plate such that the wall exhibits a convex shape in an upstream direction (relative to a flow of water). The plate 64 is fixed to a different surface 3. The basis for the rejection is und=certain since the rejection does not expressly identify how each component of the claim is to be read on the numerous surfaces and features in Figure 6 of Olsen. However, it is clear that the punching of the wall creates a protrusion rather than a recess. If the Examiner were to attempt to read the protrusion on a recess, other features of the claim could not be consistently read upon the prior art, e.g., provision of “alternating flow eddies form in the recess that assist with continued laminar flow of the air while also reducing flow resistance along the surface relative to flow in the absence of the recesses ...” as recited in claim 11. That is, there would be no recess in which the eddies would be created.

7E(5) CLAIM 19 IS ALLOWABLE UNDER SECTION 103.

In the wind power unit according to claim 19, a structure and profiles of the rotor blades are tailored to a stall speed as modified by the recesses. The rejection claims that such would be an obvious design choice but there is no teaching of record that one would tailor the structures and profiles for this purpose. The rejection is unsupported.

7E(6) CLAIM 20 IS ALLOWABLE UNDER SECTION 103.

In the wind power unit according to claim 20, control software is tailored to a stall speed as modified by the recesses. The rejection claims that such would be an obvious design choice but there is no teaching of record that one adapt control software for this purpose. The rejection is unsupported.

7E(7) CLAIM 21 IS ALLOWABLE UNDER SECTION 103.

In the wind power unit according to claim 20 a component surface is not susceptible to dirt and ice. The basis for rejecting this claim is the incorrect conclusion that the prior art discloses

“a plurality of recesses each having a shape in accord with the shape of a hemisphere, each recess positioned the same distance from all adjacent recesses ...”

and it has already been argued above that this is not the case. The rejection is based on no more than an assumption of inherency which cannot be valid when the above quoted feature is absent from the Hickey reference.

7E(8) CLAIM 23 IS ALLOWABLE UNDER SECTION 103.

In the wind power unit according to claim 23, one or more of the rotor blades includes a plurality of recesses shaped as hemispheres each positioned the same distance from all adjacent hemisphere shaped recesses. For reasons presented in the argument concerning claims 11 and 22, the Hickey reference is inconsistent with this express feature. Compare the claim language to the disclosure in the Hickey reference which expressly discloses details of a concave indentation (figure 4) that includes a protruding central deviation 46 and protruding deviation sets 48a - 48e. See col. 2, lines 46-54. These features are inconsistent with applicant's teaching of “recesses shaped as hemispheres ...”

7E(9) CLAIM 24 IS ALLOWABLE UNDER SECTION 103.

In the wind power unit according to claim 24, recesses along the mast surface are configured to reduce the region of turbulent flow so that turbulence behind the unit is smaller, having less influence on any wind power machines positioned behind the unit. The rejection does not appear to address this feature. The prior art does not relate to turbulence associated with a

first structure (e.g., a mast) which might influence performance of another structure (blades associated with a different wind power unit). So there is no basis to contend that the prior art would modify a mast of one unit with the inventive recesses in order to reduce turbulence behind that unit.

7E(10) CLAIM 26 IS ALLOWABLE UNDER SECTION 103.

Claim 26, which depends from claim 25, expressly provides that a recess can have a shape in accord with a sector of a hemisphere of arbitrary size: shapes in accord with at least a sector of a hemisphere enable the array to support a pattern of clockwise and counterclockwise flow eddies which alternate over time. The rejection does not appear to address this feature, although inherency arguments have been made in the rejection of claim 11, but these are based on the Hickey reference which expressly discloses inconsistent shapes (i.e., a concave indentation (figure 4) that includes a protruding central deviation 46 and protruding deviation sets 48a - 48e. See col. 2, lines 46-54.)

7E(11) CLAIM 27 IS ALLOWABLE UNDER SECTION 103.

Claim 27 provides that “when air flows across the surface, a pattern of the alternating flow eddies develops over the surface, extending from one recess to a next recess in the array as a function of air flow speed.” Example embodiments of these claimed features are shown in the sequence of Figures 2 – 7 and in the illustrations of Figures 8 and 9. None of the prior art discloses any such functionality. The recesses of the prior art do not comport with the claimed “shape corresponding to that of a contour of a hemisphere ...” as required by claim 22. This deficiency precludes any conclusion that the claimed feature is present in the prior art.

7E(12) CLAIM 28 IS ALLOWABLE UNDER SECTION 103.

The recesses of claim 28 are each in the shape of a hemisphere. The Hickey reference expressly discloses inconsistent shapes (i.e., a concave indentation (figure 4) that includes a

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protruding central deviation 46 and protruding deviation sets 48a - 48e. See col. 2, lines 46-54.)

No other art of record compensates for this deficiency.

7E(13) CLAIM 29 IS ALLOWABLE UNDER SECTION 103.

The mast of claim 29 includes a major surface along which the plurality of recesses are formed. This subject matter is not suggested by the prior art, i.e., the prior art does not disclose placement of recesses on a mast. Nor does the prior art suggest reducing turbulence associated with air flow along a mast.

7E(14) CLAIM 30 IS ALLOWABLE UNDER SECTION 103.

Claim 30 provides that a film with the recesses formed therein is positioned on the outside of the mast. This feature is non-obvious because the placement of the claimed recesses along a mast is not suggested in the prior art, and the prior art provides no recognition of the benefits of the claimed feature. The final office action does not provide any argument to reject this claim.

7F. THE REJECTIONS OF CLAIMS 11, 17 and 18 UNDER SECTION 103 BASED ON HICKEY (U.S. 4,974,633) IN VIEW OF WOBLEN (U.S. 6,729,846) ARE IN ERROR.

7F(1). THE REJECTION OF INDEPENDENT CLAIM 11 UNDER SECTION 103 BASED ON HICKEY (U.S. 4,974,633) IN VIEW OF WOBLEN (U.S. 6,729,846) IS IN ERROR.

Claim 11 is further rejected on a second combination of references: Hickey (U.S. 4,974,633) in view of Wobben (U.S. 6,729,846). This rejection is deficient for the same reasons noted above (concerning the Hickey reference) in argument traversing the rejection of this same claim based on Hickey in view of Olsen. Specifically, this rejection does not address the feature of:

at least one rotor blade having a plurality of recesses each having a shape in accord with the shape of a hemisphere, each recess positioned the same distance from all adjacent recesses, to improve flow arranged on the rotor blades approximately in the region between the transition point between laminar and turbulent flow and the final edge of the rotor blade and the shape and configuration of the recesses are designed such that, as the air sweeps past a recess, alternating flow eddies form in the recess that assist with continued laminar flow of the air while also reducing flow resistance along the surface relative to flow in the absence of the recesses ...

The prior art does not disclose any recesses of shape in accord with the shape of a hemisphere. The Hickey reference expressly discloses details of a concave indentation (figure 4) that includes a protruding central deviation 46 and protruding deviation sets 48a - 48e. See col. 2, lines 46-54. These features are inconsistent with applicant's teaching of recesses having the curvature of hemispheres. The final rejection (see page 3 of the final office action) nonetheless contends that example pattern 67 shown in Figure 5 of Hickey illustrates hemispherical recesses in a pattern with each positioned "the same distance from each adjacent recess ..." Claim 11 also requires that

each recess [is] positioned the same distance from **all** adjacent recesses ...

and, as can be seen from the star-shaped design of pattern 67, numerous recesses on different rays of the star which are adjacent one another are spaced apart varying distances from one another. This claim recitation reads on Appellant's own Figure 9 (in accord with text at paragraph [0038]), but this feature simply cannot be read on the pattern 67 of Hickey.

Claim 11 further requires that the mast be:

"characterized by a transition point along the flow path wherein a flow portion: (i) has predominantly laminar characteristics when travelling toward the transition point; and (ii) is characterized by turbulent flow when travelling away from the transition point ...

wherein the transition point is positioned relative to a second point on the mast coinciding with the maximum width such that the flow portion first passes along the second point before passing the transition point."

Both the prior art mast of Figure 10 and the mast 12 of Figure 11 are characterized by a transition point along the flow path wherein a flow portion: (i) has predominantly laminar characteristics when travelling toward the transition point; and (ii) is characterized by turbulent flow when travelling away from the transition point, **but**, for the mast of claim 11 (including the embodiment of Figure 11):

the transition point is positioned relative to a second point on the mast coinciding with the maximum width [of the mast] such that the flow portion first passes along the second point before passing the transition point.

Only the Appellant teaches to improve flow in a direction along the flow path about the mast of a wind power unit by displacing the recited transition point (e.g., relative to the prior art transition point 10 of Figure 10). As explained in the specification, with an arrangement of recesses (i.e., “positioned the same distance from **all** adjacent recesses”) such as shown in the example of Figure 9, the flow is modified such that:

in travelling toward the transition point the flow has predominantly laminar characteristics and
in travelling away from the transition point the flow is characterized by turbulent flow.

This rejection of claim 11 based on Hickey in view of Wobben relies on Wobben for disclosure of a film support material, but such is not recited in claim 11. The rejection also notes disclosure of recesses in the Wobben reference, but the invention relates to recesses that meet specific criteria not disclosed in Wobben or Hickey. With these distinctions claim 11 defines non-obvious subject matter.

7F(2). THE REJECTION OF CLAIM 17 UNDER SECTION 103 BASED ON HICKEY (U.S. 4,974,633) IN VIEW OF WOBHEN (U.S. 6,729,846) IS IN ERROR.

This rejection argues that disclosure in the Wobben reference of a film support material renders obvious the feature of having the recesses recited in claim 11 “configured on a flat support material, which can be fixed on or to the wind power unit.” The invention is not mere placement of a film over a surface. The passage cited from Wobben (Col. 3, lines 56 – 65) pertains to providing a “shark skin” foil with channels formed between ribs on a rotor blade (not a mast). See Figure 3 of Wobben wherein the foil appears like a series of discrete patches. It is submitted that this has so little or nothing to do with the provision of recesses

“each having a shape in accord with the shape of a hemisphere, each recess positioned the same distance from all adjacent recesses”

and has nothing to do with placement of a with the plurality of recesses of claim 11 on a film. The combination is no more than a hindsight reconstruction which is not motivated by any disclosure in the prior art.

7F(3). THE REJECTION OF CLAIM 18 UNDER SECTION 103 BASED ON HICKEY (U.S. 4,974,633) IN VIEW OF WOB BEN (U.S. 6,729,846) IS IN ERROR.

Claim 18 requires that the support material is a film. This rejection also argues that disclosure in the Wobben reference of a film support material renders obvious the feature of having the recesses recited in claim 11 “configured on a flat support material, which can be fixed on or to the wind power unit” and which is a film. The invention is not mere placement of a film over a surface. The passage cited from Wobben (Col. 3, lines 56 – 65) pertains to providing a “shark skin” foil with channels formed between ribs on a rotor blade (not a mast). See, again, Figure 3 of Wobben wherein the foil appears like a series of discrete patches. It is again submitted that this has so little or nothing to do with the provision of recesses

“each having a shape in accord with the shape of a hemisphere, each recess positioned the same distance from all adjacent recesses”

and has nothing to do with placement of a with the plurality of recesses of claim 11 on a film. The combination is no more than a hindsight reconstruction which is not motivated by any disclosure in the prior art.

7G. CONCLUSIONS

Argument has been presented to demonstrate that all of the rejections under Section 103 are deficient and that numerous ones of the dependent claims further distinguish over the prior art. The Examiner has argued rejections when claimed features are absent from or inconsistent with the prior art, and when other features must be taken out of context and reconstructed from the prior art without motivation for doing such. Because features of the claims are absent it was necessary to reconstruct the prior art with neither a teaching nor a motivation to combine or reconstruct the claimed features. Simply put, all of the rejections fail to account for an absence of

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features recited in the claims. Obviousness has been argued when the references are clearly a result of searching for pieces of claimed subject matter out of context. For the detailed reasons presented, there cannot be a prima facie case of obviousness and none of the rejections can be sustained. All of the rejections should be overturned and all of the claims should be allowed.

8. APPENDICES

An appendix containing a copy of the claims involved in this appeal is provided herewith. No evidence appendix or related proceedings appendix is provided because no such evidence or related proceeding is applicable to this appeal.

Respectfully submitted,

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9. APPENDIX OF CLAIMS ON APPEAL

11. A wind power unit and a flow field, comprising:

a mast positionable to receive a laminar flow along a path having a direction generally transverse to a direction along which the mast has a variable width, the mast including a maximum width measurable in a direction transverse to the laminar flow;

a nacelle associated with the mast;

a rotor associated with the nacelle;

a plurality of rotor blades, at least one rotor blade having a plurality of recesses each having a shape in accord with the shape of a hemisphere, each recess positioned the same distance from all adjacent recesses, to improve flow arranged on the rotor blades approximately in the region between the transition point between laminar and turbulent flow and the final edge of the rotor blade and the shape and configuration of the recesses are designed such that, as the air sweeps past a recess, alternating flow eddies form in the recess that assist with continued laminar flow of the air while also reducing flow resistance along the surface relative to flow in the absence of the recesses,

the mast characterized by a transition point along the flow path wherein a flow portion:

(i) has predominantly laminar characteristics when travelling toward the transition point; and (ii) is characterized by turbulent flow when travelling away from the transition point, and

wherein the transition point is positioned relative to a second point on the mast coinciding with the maximum width such that the flow portion first passes along the second point before passing the transition point.

12. The wind power unit according to claim 11, wherein the recesses are shaped as hemispheres and are also arranged on the mast.

15. The wind power unit according to claim 11, wherein the recesses are arranged in rows configured as an array having design such that, as the air sweeps past the recesses, multiple flow eddies form in multiple ones of the recesses that assist with passage of the air flow with reduced resistance, the array being operatively positioned in a region on the surface along which the air flow passes to cause, in the presence of flowing air, a point along the direction of the air flow at which transition between laminar and turbulent flow occurs under the force of air flow, to be displaced in the direction of the air flow, so that resistance to the air flow is reduced.

16. The wind power unit according to claim 15, wherein the rows are arranged offset with respect to each other.

17. The wind power unit according to claim 11, wherein the recesses are configured on a flat support material, which can be fixed on or to the wind power unit.

18. The wind power unit according to claim 17, wherein the support material is a film.

19. The wind power unit according to claim 11, wherein a structure and profiles of the rotor blades are tailored to a stall speed as modified by the recesses.

20. The wind power unit according to claim 11, wherein control software is tailored to a stall speed as modified by the recesses.

21. The wind power unit according to claim 11, wherein a component surface is not susceptible to dirt and ice.

22. A wind power unit comprising:
a mast;
a nacelle associated with the mast;
a rotor associated with the nacelle; and
a plurality of rotor blades, wherein the mast and rotor each include along a surface thereof a plurality of recesses each having a shape corresponding to that of a contour of a hemisphere, each recess positioned the same distance from all adjacent recesses, wherein the shape and configuration of the recesses are designed such that as the air sweeps past a recess, one or more eddy flows form in the recess that assist the passage of the air at reduced resistance relative to conditions in the absence of the recesses, and wherein a pattern of the alternating flow eddies develop over the surface, extending from one recess to a next recess in the array as a function of air flow speed.

23. The unit and flow field of claim 22 wherein one or more of the rotor blades includes a plurality of recesses shaped as hemispheres each positioned the same distance from all adjacent hemisphere shaped recesses.

24. The unit and flow field of claim 22 wherein the recesses along the mast surface are configured to reduce the region of turbulent flow so that turbulence behind the unit is smaller, having less influence on any wind power machines positioned behind the unit.

25. A wind power unit comprising:

a mast;

a rotor; and

a plurality of rotor blades configured to sweep past the mast when exposed to a force or pressure of air flowing in a direction extending toward and past the blades and mast, wherein the mast or one of the plurality of rotor blades includes along a surface thereof a plurality of recesses each having a shape in accord with at least a sector of a hemisphere, each recess positioned the same distance from all adjacent recesses, the recesses configured as an array of design such that, as the air sweeps past the recesses, flow eddies form in the recesses that assist with the passage of air flow at reduced resistance relative to flow in the absence of such recesses, the array being operatively positioned in a region on the surface along which the air flow passes to cause, in the presence of flowing air, a point along the direction of the air flow at which transition between laminar and turbulent flow occurs under the force of air flow, to be displaced in the direction of the air flow, so that resistance to the air flow is reduced.

26. The wind power unit of claim 25 wherein the provision of recesses with shapes in accord with at least a sector of a hemisphere enables the array to support a pattern of clockwise and counterclockwise flow eddies which alternate over time.

27. The wind power unit of claim 25 wherein, when air flows across the surface, a pattern of the alternating flow eddies develops over the surface, extending from one recess to a next recess in the array as a function of air flow speed.

28. The wind power unit of claim 25 wherein the recesses are each in the shape of a hemisphere.

29. The wind power unit of claim 25 wherein the mast includes a major surface along which the plurality of recesses are formed.

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30. The wind power unit of claim 25 wherein a film with the recesses formed therein is positioned on the outside of the mast.

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10. EVIDENCE APPENDIX - 37 CFR 41.37(c) (1) (ix)

None

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11. RELATED PROCEEDINGS APPENDIX - 37 CFR 41.37(c) (1) (x)

None